SOUTHWEST FISHERIES SCIENCE CENTER

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1988-1991 FIELD STUDIES ON PINNIPEDS AT SAN CLEMENTE ISLAND

By

Charles Oliver

ADMINISTRATIVE REPORT LJ-91-27

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1988-1991 FIELD STUDIES ON PINNIPEDS AT SAN CLEMENTE ISLAND

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INTRODUCTION

Pinniped research has been conducted at San Clemente Island by Southwest Fisheries Science Center (SWFSC) personnel since August of 1981. San Clemente Island is one of four islands in the Southern California Bight (SCB) where California sea lion (Zalophus californianus) rookeries exist (Seagars et al., 1985). Harbor seals (Phoca vitulina richardsi) and northern elephant seals (Mirounga angustirostris) are also found at San Clemente Island and other islands within the SCB (Stewart and Yochem, 1985). Research conducted at San Clemente Island by the SWFSC has been directed toward monitoring island population trends of these three species of pinnipeds, and in particular during 1988-1991 to monitor prey consumption by California sea lions.

In this report, I present results obtained by myself and other researchers at the SWFSC on seasonal distribution and numbers of pinnipeds, salvage of dead marine mammals, data obtained from tagged sea lions and elephant seals, disturbance factors, and cetacean sightings for the period January, 1988 through October, 1991. This report is one in a series of reports on SWFSC research conducted at San Clemente Island during 1981-1991 (Oliver and Lowry, 1987; Oliver et al., 1988; Wexler and Oliver, 1988; Lowry et al., 1990; Oliver and Wexler, 1991; Oliver, 1991).

STUDY AREA

San Clemente Island is the fourth largest and southernmost island in U.S.-water of the SCB. It is administered by the Department of the Navy, North Island Naval Air Station, San Diego, California, and is used primarily for military operations. The SWFSC study area is located on the southwest side of San Clemente Island from Seal Cove Point to an area we named "The Shack", a linear distance of approximately 7.5 km (Figure 1). The study area was divided into three distinct sub-areas: 1) north of Mail Point (NMP), 2) Mail Point (MP), and 3) south of Mail Point (SMP). The boundaries for these subareas are shown in Figure 2. The shoreline between "The Shack" and Lost Point, a linear distance of approximately 3.5 km, was occasionally surveyed. This area is adjacent and to the south of the principal study area (Figure 1). Aerial surveys to note pinniped distribution outside the study area were not conducted around the island during 1988-1991, as were done during 1984-1985. This report presents results obtained within the SWFSC study area, with a few exceptions.

METHODS

Counts and Distribution of Pinnipeds

Four ground surveys of the study area were completed each year during 1988-1991. Trips were scheduled in January, April, July, and October for each year and, with the exception of the January 1988 scheduled trip (delayed until mid-February), surveys were conducted over approximately the same dates in each of the four years. Trips were scheduled to obtain quarterly samples of California sea lion scats. Sea lions and elephant seals were censused over a two-day period, with counts made between Seal Cove Point and Mail Point on one day, and between Mail Point and Arch Rock the next day (Figures 1-2). Complete counts were obtained for sea lions and elephant seals during trips which included observations from atop Mail Point. From there animals could be surveyed below the Flat Area and on the southwest, northwest and north sides of Mail Point. If the top of Mail Point could not be reached, counts were considered incomplete, although efforts were made to estimate the number of animals at Mail Point from other locations. Censuses were made using 9x30 or 10x50 binoculars while remaining concealed behind terrain features. It was possible to approach within 50 meters of most animals without disturbing them, and often much closer. Animals in some areas were censused at greater distances, primarily the islets below Seal Cove Point and offshore of Tiki Head Beach (Figure 2). Data were recorded on field maps converted from aerial photographs of the coastline as previously described in Oliver et al. (1988). Counts for harbor seals were obtained primarily at "The Shack", a haulout approximately 1 km south of Arch Rock (Figure 2). Harbor seal counts were usually performed two days after sea lions and elephant seals had been censused and were obtained from a distance of approximately 100 meters using binoculars.

Although many animals were categorized by age-class and sex-class, sea lions and harbor seals were totaled as either pups-of-the-year or non-pups. California sea lion territorial bulls were tallied separately during the July census each year. Pups-of-the-year were animals born during the summer (May-July) of a year and were counted as pups-of-the-year through April of the following year. Thereafter, the cohorts' tally was included in counts as non-pups. This criteria was used during animal counts in 1981-1987. Non-pups consisted of adults, subadult males, juveniles and yearlings. Northern elephant seals were classified as adults, subadults, yearlings, weaned pups or unweaned pups.

California Sea Lion Food Habits Study

Scats and spewings were collected within all three sea lion haulout and rookery areas: 1) north of Mail Point, 2) Mail Point, and 3) south of Mail Point (Figure 2), although the NMP area provided little data. Up to 50 fresh scats or spewings

samples were collected during each trip in order to determine a "change in diet" for California sea lions. Because only fresh scats were collected, haulouts were not cleared of all scats during a trip. Scats were individually bagged and labeled, and subsequently stored in a freezer. Laboratory procedures and methods of analyses for samples are described in Lowry et al. (1990).

Salvage of Dead Marine Mammals

Dead marine mammals were occasionally salvaged at all haulout areas and during beach surveys from Lost Point to "The Shack", although less emphasis was placed on salvage beginning in 1987. Because salvage efforts were generally conducted while censusing an area and searching for tagged animals and scats, only those dead animals which could be reached without disturbing live animals were potential salvage specimens. To reduce the amount of disturbance to animals, dead animals in most of the Mail Point area and on the beaches below the Uppers to south of Mail Point (Figure 2) were not salvaged, although these were tallied. Salvaged marine mammal carcasses were marked with red surveyor's tape, or removed and destroyed, so that carcasses would not be mistaken for recent strandings during subsequent trips. All specimen materials are stored at the SWFSC. Pinniped salvage data were recorded in field notebooks for subsequent entry onto the SWFC database PINNLIFE.DAT, but because of personnel changes at the SWFSC, data collected during 1988-1991 were not entered into this database.

Sightings of Tagged or Entangled Pinnipeds

Tag numbers of previously tagged pinnipeds were obtained during each census using 9x30 binoculars, 10x50 binoculars, and 20x45 zoom spotting scopes. The tag number, color, condition of tag, location of tag (left, right, or both flippers), and the animals' age-class, condition, association and behavior were recorded. These data were subsequently coded and entered into the SWFSC database STAGDB.DAT for all 16 trips during 1988-1991. The number of individuals observed to be entangled in debris and information on the nature of the debris were recorded.

RESULTS and DISCUSSION

Counts and Distribution of Pinnipeds

California sea lion

The numbers of California sea lions censused within the study area are presented, by sub-area (NMP, MP, SMP), for 1988-1991 in Tables 1-4 and Figures 3-6. Complete counts within the study area were obtained during 15 of our 16 trips. Total counts ranged from a low of 1,149 during October 1990 to 3,895 during January 1989. The latter count, although incomplete, represents the greatest number of animals observed within the study area since studies began in August of 1981. Pup counts obtained during July for 1988-1991 were 803 (1988), 795 (1989), 629 (1990), and 913 (1991). Although the NMP shoreline is longer than either the MP or SMP shorelines, animals have been observed at other than Seal Cove Point and between the "Small Cliffs" and Tiki Head Bridge Beach (Figure 2) on only two occasions. These two sightings were of less than 10 juveniles and subadult males, and both occurred between Mail Point and Tiki Head Bridge Beach.

Pups were most abundant at Mail Point during 14 of 16 censuses (36-79%), while the SMP area accounted for 12-55%, and the NMP area 7-32% of the total pup count (Tables 1-4). Pups were most abundant in the SMP area during April and July of 1991. Mail Point produced the greatest number of pups during July of each year, with the exception of 1991 when we counted 18 more pups in the SMP area (408 pups) than at Mail Point (390 pups). Mail Point also had the highest ratio of pups to total number of animals during July and October of each year except for July 1989 when the NMP area ratio slightly exceeded the ratio at Mail Point (Figures 7-8).

There was a marked change in the season of peak nonpup abundance at SCI during 1988-1991 compared with 1982-1987. The number of nonpups on the island varied during each year, with the greatest counts obtained during May-July for 1983-1987, and 1991. These summer peaks ranged from 790 nonpups in June, 1985 to 1,560 nonpups in July, 1991. We observed decreases in the number of animals at SCI during the fall and early winter (September-December) of each year 1982-1991. These declines in the number of nonpups during the fall and early winter were followed by rapid increases in late winter and spring (January-April) during 1982-1991.

In contrast to counts obtained during 1983-1987 and 1991, peak numbers of California sea lion nonpups occurred during late winter to early spring (January-April) in 1982, and 1988-1990. These latter counts represent the greatest numbers of California sea lion nonpups we have observed since our studies began in 1981, ranging from 1,582 (April 1988) to 3,803 (January 1989). Following these late-winter to spring peaks in 1988-1990, the

numbers of California sea lion nonpups decreased through the summer breeding season. We observed a fall decrease in numbers during each year (1988-1991), as we reported for 1982-1987, and a subsequent increase during January-April for all four years.

The increased numbers of animals observed during late-winter to spring were primarily comprised of juveniles and subadult males, which occupied all three subareas, and adult females at the onset of the breeding season. During 1982-1987, although increases were observed in all three subareas, the greatest concentrations of these age-classes were observed in the SMP area during the late winter to spring and on into the summer months. Similar trends were observed during 1988 and 1991, but during the late winter to spring of 1989 and 1990 the increased number of nonpups within the study area were located primarily at Mail Point.

Northern elephant seal

Data previously reported for 1984 contained errors in the age-class allocations of northern elephant seal pups and nonpups observed during an early May census (Wexler and Oliver, 1988; Tables 1 and 3). We previously reported 23 pups at Mail Point for the May 3-7, 1984 trip. These animals were yearlings. The correct allocations are zero pups and 53 nonpups for Table 1 and, zero pups and 43 yearlings for Table 3 in Wexler and Oliver (1988).

The greatest numbers of northern elephant seals were observed during mid-to-late-April trips in 1988, 1989, and 1991 (106 seals, 81 seals, and 208 seals, respectively) and 57 seals in early-April of 1990 (Tables 1-4). During 1982-1984, counts were obtained during mid-April to early-May (47 seals in 1982, 44 seals in 1983, and 53 seals in 1984). During 1985-1987, counts were obtained in March and again in late-May to June. Fewer northern elephant seals were seen at San Clemente Island during 1985-1987 (1 to 23 animals), possibly because trips did not coincide with a peak haulout associated with the spring molt. A second peak in numbers occurred during the fall (mid-to-late-October) although the number of northern elephant seals was less than observed around the period of the spring molt. Mid-October counts obtained in 1981, 1982 and 1987 (15, 18, and 31 seals, respectively) were less than counts obtained during mid-October in 1988-1991 (30 to 59 seals).

Pups were not observed at San Clemente Island during 1988-1990 although there were seals, including young but mature females, at Mail Point during early January of 1989 and 1990 (15 and 11 seals, respectively). Three newborn pups and 12 nonpups were seen at Mail Point during January 11-14, 1991. No pups were observed in the larger groups of seals observed at Mail Point during April of these four years. Although the timing of our trips precludes any definitive statements on the number of pups born, if any, at San Clemente Island during 1988-1990, prior experience at SCI suggests that northern elephant seal pups are

most likely to be seen during the period January-March. Thus, it is possible that some pups were born and subsequently weaned at the island during 1988-1990, as observed in 1991. I have previously reported the number of northern elephant seal pups born within the study area at San Clemente Island during 1982-1991 as 5,0,3,2,1,1,0,0,0, and 3, respectively.

The greatest number of northern elephant seals were at Mail Point during the spring molt which probably peaks at San Clemente Island during mid-April to early-May, and again in the latter half of October. Although there has been an increase in the number of seals that molt at the island over the period 1982-1991, most of these seals were not born on San Clemente Island.

Harbor seal

Harbor seals were observed at "The Shack" (Figure 2) during five of the nine surveys. (Tables 1-4). The greatest number of animals observed totaled 28 during February 1988, and the fewest totaled 9 during July 1991. No harbor seal pups were noted, although the timing of trips (April rather than March) may have precluded such an observation. Pups were observed during March counts in each year for 1982-1987. On two separate trips a single harbor seal was observed at Mail Point and, on another trip a lone animal in the NMP area. These results indicate that a few harbor seals consistently utilize haulouts within the study area, as previously reported for the period 1981-1987. Three seals were observed at Lost Point during July 1990, but no observations were made between Lost Point and China Point, nor the Northwest Harbor Islet; areas in which I had previously observed small numbers of harbor seals during 1981-1987.

California Sea Lion Food Habits Study

A total of 823 fresh or semi-fresh scats, and 68 spewings were collected from California sea lions during 1988-1991 (Table 5). The number of samples collected during a trip ranged from 15 to 79 samples, primarily obtained from the MP and SMP subareas. Only a few samples were obtained from the NMP subarea. Laboratory procedures are described in Lowry et al., (1990), as are the results obtained from an analysis of scats collected at San Clemente Island during 1981-1986. Results from scats and spewings collected during 1987-1991 will be presented in a separate report.

Salvage of Dead Marine Mammals

Three northern elephant seals, one harbor seal, and 61 California sea lions were found dead within the study area (Appendix 1). Data were obtained from eight of these specimens. A 207cm northern right whale dolphin, Lissodelphis borealis, was also

salvaged on April 16, 1988 just south of Mail Point. Data were obtained on a short-finned pilot whale, Globicephala macrorhynchus, and a harbor seal stranded on the northwest shoreline on February 19, 1988. A summary of salvaged California sea lions, by age-class, is presented in Table 6.

Because of the reduced effort placed on salvage beginning in 1987, the data presented in Table 6 and Appendix 1 are of limited use, and these data should not be compared with salvage data obtained during 1981-1986 at San Clemente Island when efforts to examine specimens and collect samples were more vigorous. Counts of dead, premature California sea lion pups were obtained each April, and the number of dead pups-of-the-year were counted during each census. The greater number of dead pups-of-the-year counted during July and October of 1990 (15 and 17 specimens, respectively) coincided with a decrease in the number of live pups counted in July 1990 (629 animals) compared with 1988 (803 animals), 1989 (795 animals), and 1991 (913 animals). It is possible that there was increased neonatal mortality during 1990, which resulted in the observed decrease in the number of live pups counted in July 1990.

Sightings of Tagged and Entangled Pinnipeds

Data were recorded on sightings of California sea lions and northern elephant seals which had previously been tagged with Reise or Roto tags at San Clemente Island (white tags), or elsewhere (non-white tags). These data were obtained during each trip and the total number of California sea lions observed bearing unique, white-colored tag numbers are shown in Table 7. No white-tagged California sea lions from either the 1981 or 1982 cohorts were seen during 1988-1991. A female northern elephant seal, which had been previously been double-tagged as a pup at San Clemente Island on March 17, 1987 was seen on April 16 and 17, 1988, and again on October 15, 1988 at Mail Point. The SWFSC has not received any reports of animals tagged at San Clemente Island (white tags) having been observed elsewhere during 1988-1991.

Because of difficulty in reading the tag numbers, not all of the tagged California sea lions and northern elephant seals observed at SCI were uniquely identified. Many of the black painted numbers on the colored tags were faded or worn, leaving only the embossed outline of the numbers on the tag. Tagged animals were often at too great a distance to obtain the tag number, even with a spotting scope, and others only partially displayed their tags because of their resting position or the presence of other animals. Thus, the tag numbers obtained (Table 7) represent most, but not all, of the tagged animals observed on each trip.

Data were obtained for 56 live California sea lions and 23 northern elephant seals bearing non-white colored tags during 1988-1991 (Table 8). These non-white tags indicate the animals

had previously been tagged somewhere other than San Clemente Island. Most of these animals bore red tags indicating they had been tagged at San Nicolas Island. A single California sea lion bore a blue tag (Santa Barbara Island), and one sea lion was seen with an orange tag (rehabilitation center). Five yellow-tagged California sea lions and six yellow-tagged northern elephant seals were seen. These animals were previously tagged at San Miguel Island. A few additional non-white tagged animals were observed at SCI during the period, but the tag numbers were not obtained for these animals.

California sea lion entanglement with debris was first noted in June 1985, when an adult female California sea lion was noted with a "possible gear net scar" encircling its neck (Oliver and Wexler, 1991). A yearling California sea lion was observed with "three strands of monofilamemt netting around its neck" in June 1986, and another in September 1986 (Oliver 1991). A sea lion pup was similarly entangled during March 1987, and during October 1987, two sea lion juveniles and a northern elephant seal were observed with gillnet encircling their necks (Oliver 1991). Beginning in 1988, instructions to identify entanglements were included in the census effort. Entanglements were observed on all 16 trips during 1988-1991, mostly involving juvenile animals, at rates between 0.085 % to 0.350% of the total number of California sea lions counted during each trip (Table 9). All but one of these entanglements involved monofilamemt netting around the head or neck of an animal, but also included fishhooks embedded in the mouth or body of an animal, and on one occasion plastic banding material. No evidence of entanglements by northern elephant seals were observed during 1988-1991.

Disturbance Factors

Evidence of potential and actual disturbance to pinnipeds within our study area was observed on some, but not all, trips to the island. Past observations and discussions with island personnel indicate the following activities occur: 1) island personnel observing animals at the rookery and haulouts, 2) military aircraft flying over these areas at low altitudes, and 3) commercial, sport fishing, and pleasure vessels routinely operating within 50-100 meters of rookery areas. Island personnel were encountered at Mail Point who expressed their intent to "watch and photograph the seals", although standing orders designate the study area as restricted access. A locked shelter was burglarized in February and July 1988, April 1989, and again in January and July 1990. Navy jets "buzzed" Mail Point during July 1988, April 1990, and April 1991, and Navy helicopters were observed flying very low over the area during October 1988, and April 1991. During July 1990 (the peak of the California sea lion breeding season), four US Marines in two "Humvees" drove to Mail Point with the expressed intention of ascertaining the existence of two US Geodetic Survey markers placed atop Mail Point in 1933.

Abalone, lobster, SCUBA diving, pleasure, and sportfishing vessels were observed operating within as little as 10 meters of hauled-out animals. Lobster boats were especially numerous in October when the season opens. During July 1989, three people on a sailboat were observed to anchor within 50 meters of Mail Point, launch a dingy, and attempt to come ashore in the middle of the rookery at Mail Point. In April 1990, a crewmen on a fishing boat repeatedly fire a rifle in the direction of California sea lions in the water.

Cetaceans

Only one cetacean was salvaged within the study area at San Clemente Island during 1988-1991. A 207 cm northern right whale dolphin, Lissodelphis borealis, was salvaged on April 16, 1988 just south of Mail Point (Appendix 1). A pilot whale, Globicephala macrorhynchus, was salvaged outside the study area during February 1988 at the west end of the runway. A report of a dead blue whale, Balaenoptera musculus, stranded just south of Lost Point was received during July 1988. This specimen, a male approximately 13 meters in length, was examined on July 19, 1988 by personnel from the Los Angeles Museum of Natural History (pers. comm., John Heyning).

A school of common dolphin, Delphinus delphis, was observed near Mail Point in July 1988, and gray whales, Eschrichtius robustus, were seen within approximately one nautical mile or less of shore between Mail Point and Lost Point during February 1988 (12 whales), January 1990 (56 whales), April 1990 (2 whales), and January 1991 (26 whales). No gray whale blows were noted during the January and April trips in 1989, nor during the April 1991 trip.

Other observations

A total of 68 dead brown pelicans, Pelecanus occidentalis, were counted at Mail Point in February 1988, shortly after a big storm. This count was much greater than the 2 or 3 dead birds normally found. Thirty-three live elegant terns, Sterna elegans, were observed at Mail Point during October 1989, which was my first observation of this species.

A male Guadalupe fur seal, Arctocephalus townsendi, was observed at Mail Point on July 13, 1991. This sighting was the first at SCI since studies began in August 1981. Six California sea lion adult males maintained approximately equal territories (20-30 meters) on either side of the Guadalupe fur seal. No fur seal females or pups were observed. There were numerous California sea lion pups and some females within a few meters of the fur seal, but no obvious encounters. The animal was observed at the same location on July 14 and July 15, 1991, and appeared to be holding a territory although only one interaction with a California sea

lion adult male (territorial bull) was observed on July 14. While the fur seal was facing the water and prone on a large rock about five meters from the water, the bull attempted to move from above the fur seal towards the water. As the California sea lion bull came abreast of the fur seal at about three meters, the fur seal leaped towards the rear of the California sea lion bull which then lunged for the water. The fur seal pursued the bull until both entered the water. The fur seal then exited the water, made a few barks (sounds like "whoop"), and returned to the large rock. California sea lion females and pups remained in the immediate vicinity during this brief encounter.

On July 15, 1991, seven adult and two juvenile harbor seals were observed hauled out at "The Shack" (Figure 2). A sea otter, Enhydra lutris, was seen in the water near one of the hauled-out juvenile seals. This area is very shallow and well inside the kelp bed. It consists of a series of table reefs which are exposed at low tides. At one point the otter was less than 20 meters from the shoreline. The sighting of the sea otter was the first at SCI since studies began in August 1981. The otter and seals were observed for 35 minutes and a number of photographs were taken. The otter bore a white tag on the left rear flipper and a lime-green tag on the right rear flipper. When first observed, the otter and a juvenile seal were face-to-face at a distance of less than one foot. The harbor seal (one of a group of five) entered the water and the two animals engaged in some very active swimming and diving while remaining very close. During one period, the harbor seal was at the surface with head and rear flippers submerged, while the sea otter made more than a dozen quick dives (or shallow submersions) around the harbor seal at a distance of less than a foot. The juvenile harbor seal subsequently hauled-out again and the sea otter continued to swim and occasionally dive within an area approximately 50 meters in diameter. The sea otter approached a lone adult harbor seal seaward of the others, which subsequently entered the water. While these two animals (seal and otter) swam near one another briefly, none of the vigorous activity observed earlier involving the otter and a juvenile seal was noted. The harbor seal then hauled-out, and the sea otter resumed swimming and diving. It appeared to be feeding because it was observed to repeatedly return to the surface with either limpets or small abalone.

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Table 1. Numbers and distribution of pinnipeds within the principal study area between "The Shack" and Seal Cove Point at San Clemente Island, by data collection period, for 1988. Data were obtained during ground counts.

Trip Period Dates	Location[1]	CALIFORNIA SEA LION 1987 Pups	1988 Pups	Non-pup	?	Total Number	BULLS	NORTHERN ELEPHANT SEAL 1988 Pups	Non-pup	HARBOR SEAL 1988 Pups	Non-pup
February 19-22 1988	SMP	121	0	541	0	662		0	0	0	28
	MP	171	0	542	0	713		0	0	0	0
	NMP	83	0	302	0	385		0	0	0	0
	Totals	375	0	1385	0	1760		0	0	0	28
April 16-18 1988	SMP	92	0	368	103	563		0	18	No Data	
	MP	196	0	774	0	970		0	88	0	0
	NMP	63	0	337	0	400		0	0	0	0
	Totals	351	0	1479	103	1933		0	106	-	-
July 29 - August 1 1988	SMP	-	269	464	0	733	18	0	0	0	0
	MP	-	433	369	0	802	33	0	0	0	0
	NMP	-	101	127	0	228	14	0	0	0	0
	Totals	-	803	960	0	1763	65	0	0	0	0
October 14-17 1988	SMP	-	57	162	75	294		0	1	No Data	
	MP	-	309	469	200	978		0	48	0	0
	NMP	-	115	327	0	442		0	0	0	0
	Totals	-	481	958	275	1714		0	49	-	-

[1]SMP - "The Shack" to Mail Point (3.0 km of coastline).
MP - Mail Point area (0.5 km of coastline).
NMP - Mail Point to Seal Cove Point (4.0 km of coastline).
[2]Incomplete count for area or trip.

Table 2. Numbers and distribution of pinnipeds within the principal study area between "The Shack" and Seal Cove Point at San Clemente Island, by data collection period, for 1989. Data were obtained during ground counts.

Trip Period Dates	Location[1]	CALIFORNIA SEA LION 1988 Pups	1989 Pups	1989 Non-pup	1989 ?	1989 Total Number	1989 BULLS	NORTHERN ELEPHANT SEAL 1989 Pups	1989 Non-pup	HARBOR SEAL 1989 Pups	1989 Non-pup
January 6-9 1989	SMP	-	0	-	632	632		0	1	No Data	
	MP[2]	-	0	-	2730	2730		0	14	0	0
	NMP	92	0	441	0	533		0	0	0	0
	Totals[2]	92	0	441	3362	3895		0	15	-	-
April 14-17 1989	SMP	-	0	-	502	502		0	0	0	19
	MP	24	0	1140	0	1164		0	81	0	0
	NMP	22	0	487	0	509		0	0	0	0
	Totals	46	0	1627	502	2175		0	81	0	19
July 21-24 1989	SMP	-	217	507	0	724	20	0	0	No Data	
	MP	-	468	815	0	1283	30	0	0	0	0
	NMP	-	110	138	0	248	15	0	0	0	0
	Totals	-	795	1460	0	2255	65	0	0	-	-
October 13-16 1989	SMP	-	208	303	0	511		0	24	No Data	
	MP	-	326	486	0	812		0	6	0	0
	NMP	-	72	174	0	246		0	0	0	0
	Totals	-	606	963	0	1569		0	30	-	-

[1] SMP - "The Shack" to Mail Point (3.0 km of coastline).
MP - Mail Point area (0.5 km of coastline).
NMP - Mail Point to Seal Cove Point (4.0 km of coastline).

[2] Incomplete count for area or trip.

Table 3. Numbers and distribution of pinnipeds within the principal study area between "The Shack" and Seal Cove Point at San Clemente Island, by data collection period, for 1990. Data were obtained during ground counts.

Trip Period Dates	Location[1]	CALIFORNIA SEA LION 1989 Pups	1990 Pups	Non-pup	?	Total Number	BULLS	NORTHERN ELEPHANT SEAL 1990 Pups	Non-pup	HARBOR SEAL 1990 Pups	Non-pup
January 5-9 1990	SMP	62	0	323	0	385		0	0	No Data	
	MP	280	0	1408	0	1688		0	11	0	0
	NMP	81	0	543	0	624		0	0	0	0
	Totals	423	0	2274	0	2697		0	11	-	-
April 6-9 1990	SMP	68	0	528	0	596		0	23	0	19
	MP	387	0	694	0	1081		0	34	0	0
	NMP	34	0	348	0	382		0	0	0	1
	Totals	489	0	1570	0	2059		0	57	0	20
July 20-23 1990	SMP	-	208	380	0	588	42	0	0	0	18
	MP	-	313	404	0	717	31	0	0	0	0
	NMP	-	108	176	0	284	15	0	0	0	0
	Totals	-	629	960	0	1589	88	0	0	0	18
October 12-15 1990	SMP	-	187	206	0	393		0	3	0	0
	MP	-	329	248	0	577		0	32	0	0
	NMP	-	99	80	0	179		0	0	0	0
	Totals	-	615	534	0	1149		0	35	0	0

[1]SMP - "The Shack" to Mail Point (3.0 km of coastline).
MP - Mail Point area (0.5 km of coastline).
NMP - Mail Point to Seal Cove Point (4.0 km of coastline).
[2]Incomplete count for area or trip.

Table 4. Numbers and distribution of pinnipeds within the principal study area between "The Shack" and Seal Cove Point at San Clemente Island, by data collection period, for 1991. Data were obtained during ground counts.

Trip Period Dates	Location[1]	CALIFORNIA SEA LION 1990 Pups	1991 Pups	Non-pup	?	Total Number	BULLS	NORTHERN ELEPHANT SEAL 1991 Pups	Non-pup	HARBOR SEAL 1991 Pups	Non-pup
January 11-14 1991	SMP	132	0	429	0	561		0	1	0	0[3]
	MP	226	0	431	0	657		3	12	0	0
	NMP	169	0	357	0	526		0	1	0	1
	Totals	527	0	1217	0	1744		3	14	0	0[3]
April 26-29 1991	SMP	113	0	768	0	881		0	51	No Data	
	MP	75	0	105	0	180		0	155	0	1
	NMP	18	0	91	0	109		0	2	0	0
	Totals	206	0	964	0	1170		0	208	-	-
July 12-15 1991	SMP	-	408	764	0	1172	26	0	0	0	9
	MP	-	390	464	0	854	31	0	0	0	0
	NMP	-	115	332	0	447	20	0	0	0	0
	Totals	-	913	1560	0	2473	77	0	0	0	9
October 25-28 1991	SMP	-	170	180	0	350		0	2	0	19
	MP	-	358	258	0	616		0	57	0	0
	NMP	-	128	150	0	278		0	0	0	0
	Totals	-	656	588	0	1244		0	59	0	19

[1] SMP - "The Shack" to Mail Point (3.0 km of coastline).
MP - Mail Point area (0.5 km of coastline).
NMP - Mail Point to Seal Cove Point (4.0 km of coastline).
[2] Incomplete count for area or trip.
[3] Heavy surf during the trip kept the haulout awash during daylight hours of observation.

Table 5. Numbers of California sea lion scats and spewings collected at San Clemente Island during 1988-1991.

Trip Period Dates	Area of Collection[1]	NUMBER OF SCATS COLLECTED Fresh scats	Fresh spewings	Totals
February 19-22, 1988	SMP, MP	49	1	50
April 16-18, 1988	SMP, MP	59	0	59
July 29 - Aug 1, 1988	SMP, MP, NMP	42	0	42
October 14-17, 1988	SMP, MP	13	2	15
January 6-9, 1989	SMP	33	35	68
April 14-17, 1989	SMP, MP	55	0	55
July 21-24, 1989	SMP, MP	77	2	79
October 13-16, 1989	SMP, MP	68	11	79
January 5-9, 1990	MP	61	9	70
April 6-9, 1990	SMP, MP	50	0	50
July 20-23, 1990	SMP, MP	55	0	55
October 12-15, 1990	SMP, MP	50	0	50
January 11-14, 1991	SMP, MP	51	8	59
April 26-29, 1991	SMP, MP	52	0	52
July 12-15, 1991	SMP	53	0	53
October 25-28, 1991		55	0	55
TOTALS		823	68	891

[1]SMP - "Arch Rock" to Mail Point (1.4 km of coastline)
MP - Mail Point Area (0.5 km of coastline)
NMP - Mail Point to Seal Cove Point (4.0 km of coastline)

Table 6. Summary of dead California sea lions found within the principal area between Seal Cove Point and "The Shack", by trip period, during 1988-1991.

Trip Period Dates	Number of dead California sea lions				
	Premature	Pups of the year	Non-pup	Adults	Unknown
February 19-22, 1988	0	0	0	0	0
April 16-18, 1988	4	0	3	0	2
July 29 - Aug 1, 1988	0	0	1	1	0
October 14-17, 1988	0	0	0	0	0
January 6-9, 1989	0	3	0	3	14
April 14-17, 1989	0	0	0	0	0
July 21-24, 1989	0	0	0	0	0
October 13-16, 1989	0	3	0	2	0
January 5-9, 1990	0	0	0	0	3
April 6-9, 1990	0	0	2	2	0
July 20-23, 1990	0	15	0	4	0
October 12-15, 1990	0	17	1	5	0
January 11-14, 1991	0	0	1	0	0
April 26-29, 1991	16	0	0	0	0
July 12-15, 1991	0	0	0	0	0
October 25-28, 1991	0	16	3	3	0

Table 7. Number of unique resights of California sea lions previously tagged at San Clemente Island, by trip period, for the period 1988-1991. Only those tagged animals for which we were able to read the number on the white-colored tag are included in this table. Multiple resights of any individual animal during a trip period were not included in the counts.

Trip Period Dates	COHORT				
	1983	1984	1985	1986	Total
February 19-22, 1988	0	1	3	4	8
April 16-18, 1988	1	10	5	5	21
July 29 - Aug 1, 1988	0	10	5	3	18
October 14-17, 1988	0	2	6	6	14
January 6-9, 1989	0	2	5	7	14
April 14-17, 1989	2	5	11	11	29
July 21-24, 1989	0	8	8	5	21
October 13-16, 1989	1	1	6	3	11
January 5-9, 1990	0	5	2	2	9
April 6-9, 1990	2	1	4	7	14
July 20-23, 1990	1	1	3	3	8
October 12-15, 1990	0	1	2	0	3
January 11-14, 1991	0	0	4	2	6
April 26-29, 1991	0	0	1	0	1
July 12-15, 1991	0	0	0	2	2
October 25-28, 1991	0	0	1	0	0

able 8. Resights of non-white tagged California sea lions and northern elephant seals, within the study area at San Clemente Island, during 1988-1991.

ag Resight Date	Tag Number, Color, Type, and Location	Species	Area Where Animal Was Tagged
ebruary 20, 1988	E065 Red Reise (Left)	Zalophus californianus	San Nicolas Island
	H002 Red Reise (Left and Right)	Zalophus californianus	San Nicolas Island
	K002 Red Reise (Left)	Zalophus californianus	San Nicolas Island
	Z223 Red Reise (Left)	Zalophus californianus	San Nicolas Island
ebruary 21, 1988	C095 Red Reise (Right)	Zalophus californianus	San Nicolas Island
	E025 Red Reise (Left and Right)	Zalophus californianus	San Nicolas Island
	Z024 Red Reise (Right)	Zalophus californianus	San Nicolas Island
	Z064 Red Reise (Left and Right)	Zalophus californianus	San Nicolas Island
	Z224 Red Reise (Left and Right)	Zalophus californianus	San Nicolas Island
	Z451 Red Reise (Left)	Zalophus californianus	San Nicolas Island
pril 16, 1988	A072 Red Reise (Right)	Zalophus californianus	San Nicolas Island
	A115 Yellow Reise (Right)	Zalophus californianus	San Miguel Island
	C014 Red Reise (Right; no Left)	Zalophus californianus	San Nicolas Island
	C088 Red Reise (Left and Right)	Zalophus californianus	San Nicolas Island
	C669 Red Reise (Left)	Mirounga angustirostris	San Nicolas Island
	J019 Red Reise (Left; Right tag present)	Zalophus californianus	San Nicolas Island
	M013 Red Reise (Right)	Zalophus californianus	San Nicolas Island
	Z296 Red Reise (Right; Left tag present)	Zalophus californianus	San Nicolas Island
	Z395 Red Reise (Right)	Zalophus californianus	San Nicolas Island
	Z404 Red Reise (Left)	Zalophus californianus	San Nicolas Island
pril 17, 1988	811 Red Reise (Left and Right)	Zalophus californianus	San Nicolas Island
	5239 Red Reise (Left)	Mirounga angustirostris	San Nicolas Island
	E122 Yellow Reise (Left)	Mirounga angustirostris	San Miguel Island
	Z444 Red Reise (Right)	Zalophus californianus	San Nicolas Island
	Z455 Red Reise (Right; Left tag present)	Zalophus californianus	San Nicolas Island
ly 29, 1988	Z033 Red Reise (Left and Right)	Zalophus californianus	San Nicolas Island
tober 15, 1988	H510 Yellow Reise (Left and Right)	Mirounga angustirostris	San Miguel Island
nuary 7, 1989	5433 Red Reise (Right)	Mirounga angustirostris	San Nicolas Island
	I028 Red Reise (Left)	Zalophus californianus	San Nicolas Island
	M000 Red Reise (Left and Right)	Zalophus californianus	San Nicolas Island
	Z197 Red Reise (Left)	Zalophus californianus	San Nicolas Island
	A1244 Yellow Reise (Left; Right tag present)	Mirounga angustirostris	San Miguel Island
nuary 8, 1989	5433 Red Reise (Right)	Mirounga angustirostris	San Nicolas Island
	A064 Red Reise (Left)	Zalophus californianus	San Nicolas Island
	K091 Red Reise (Right)	Zalophus californianus	San Nicolas Island
	Z024 Red Reise (Right)	Zalophus californianus	San Nicolas Island
	Z171 Red Reise (Left)	Zalophus californianus	San Nicolas Island
	A1196 Yellow Reise (Left)	Zalophus californianus	San Miguel Island
ril 15, 1989	K033 Red Reise (Right)	Zalophus californianus	San Nicolas Island
	A???? Yellow Reise (Right)[1]	Zalophus californianus	San Miguel Island
	A1326 Yellow Reise (Right)[2]	Zalophus californianus	San Miguel Island
ril 16, 1989	A047 Red Reise (Left and Right)	Zalophus californianus	San Nicolas Island
	Z404 Red Reise (Left)	Zalophus californianus	San Nicolas Island
ly 22, 1989	Z453 Red Reise (Left and Right)	Zalophus californianus	San Nicolas Island
ly 23, 1989	Z033 Red Reise (Right)	Zalophus californianus	San Nicolas Island
tober 14, 1989	Z305 Red Reise (Right)	Zalophus californianus	San Nicolas Island
tober 15, 1989	Z197 Red Reise (Left and Right)	Zalophus californianus	San Nicolas Island
	Z408 Red Reise (Right)	Zalophus californianus	San Nicolas Island

Table 8. continued

Tag Resight Date	Tag Number, Color, Type, and Location	Species	Area Where Animal Was Tagged
January 6, 1990	A033 Red Reise (Right)	Zalophus californianus	San Nicolas Island
	Z490 Red Reise (Left)	Zalophus californianus	San Nicolas Island
January 8, 1990	J048 Red Reise (Right)	Zalophus californianus	San Nicolas Island
	M016 Red Reise (Left)	Zalophus californianus	San Nicolas Island
April 7, 1990	0466 Yellow Reise (Right; no Left)	Mirounga angustirostris	San Miguel Island
	5774 Orange Roto (Right; no Left)	Zalophus californianus	Rehabilitation Lab
	K035 Red Reise (Left)	Zalophus californianus	San Nicolas Island
April 9, 1990	J073 Red Reise (Right)	Zalophus californianus	San Nicolas Island
January 12, 1991	Z404 Red Reise (Left)	Zalophus californianus	San Nicolas Island
January 13, 1991	E095 Red Reise (Right)	Zalophus californianus	San Nicolas Island
	Z??? Red Reise (Right)	Zalophus californianus	San Nicolas Island
January 14, 1991	??? Blue Reise	Zalophus californianus	San Barbara Island
	J030 Red Reise (Left and Right)	Zalophus californianus	San Nicolas Island
April 27, 1991	6421 Red Roto (Right; no Left)	Mirounga angustirostris	San Nicolas Island
	6423 Red Roto (Right; no Left)	Mirounga angustirostris	San Nicolas Island
	Z414 Red Reise (Right)	Zalophus californianus	San Nicolas Island
April 28, 1991	Yellow Reise (Right; no Left)	Mirounga angustirostris	San Miguel Island
	1198 Yellow Reise (Right; no Left)	Mirounga angustirostris	San Miguel Island
	6129 Red Roto (Left; no Right)	Mirounga angustirostris	San Nicolas Island
	6193 Red Roto (Right; no Left)	Mirounga angustirostris	San Nicolas Island
	6329 Red Roto (Right; no Left)	Mirounga angustirostris	San Nicolas Island
	6423 Red Roto (Right; no Left)	Mirounga angustirostris	San Nicolas Island
April 29, 1991	6146 Red Roto (Left; no Right)	Mirounga angustirostris	San Nicolas Island
	6193 Red Roto (Right; no Left)	Mirounga angustirostris	San Nicolas Island
	6200 Red Roto (Right; no Left)	Mirounga angustirostris	San Nicolas Island
	6329 Red Roto (Right; no Left)	Mirounga angustirostris	San Nicolas Island
	6417 Red Roto (Right; no Left)	Mirounga angustirostris	San Nicolas Island
	6423 Red Roto (Right; no Left)	Mirounga angustirostris	San Nicolas Island
	6425 Red Roto (Right; no Left)	Mirounga angustirostris	San Nicolas Island
July 13, 1991	??? Red Reise (Right)	Zalophus californianus	San Nicolas Island
	??? Yellow Reise (Right)	Zalophus californianus	San Miguel Island

[1] - This animal also bore a branded mark (11) on the hindquarter.
[2] - This animal also bore a branded mark (121) on the hindquarter.

Table 9. Numbers of California sea lions, by age class, observed entangled with debris at San Clemente Island during 1988-1991. All ocurrences were within the study area and involved entanglemet with monofilament netting encircling the animals neck unless otherwise noted.

Trip Period Dates	Number of Entanglements Observed					Total number of California sea lions seen	Entanglment Rate (%)
	Pup	Juvenile	SAM	Adult Male	Adult Female	Subtotal	
February 19-22, 1988		5[1]	1		6	1760	.341
April 16-18, 1988		5[2]		1[3]	6	1933	.310
July 29 - Aug 1, 1988		3			3	1763	.170
October 14-17, 1988	1	5			6	1714	.350
January 6-9, 1989		5		1	6	3895	.154
April 14-17, 1989		1	1		2	2177	.092
July 21-24, 1989		5			5	2255	.222
October 13-16, 1989		4	1		5	1569	.319
January 5-9, 1990		8	1		9	2697	.334
April 6-9, 1990		3[4]	2		5	2059	.243
July 20-23, 1990		4			4	1589	.252
October 12-15, 1990	1				1	1149	.087
January 11-14, 1991		4			4	1744	.229
April 26-29, 1991		1			1	1170	.085
July 12-15, 1991		4			4	2473	.162
October 25-28, 1991				2		1244	.161

[1] A sixth juvenile exhibited an encompassing neck scar, but no visible debris.
[2] One of the five also exhibited a fishhook, with trailing line, in the mouth.
[3] Entangled with plastic banding debris and not monofilament netting.
[4] A fourth juvenile exhibited a fish hook, with 40 feet of trailing line, in the mouth.

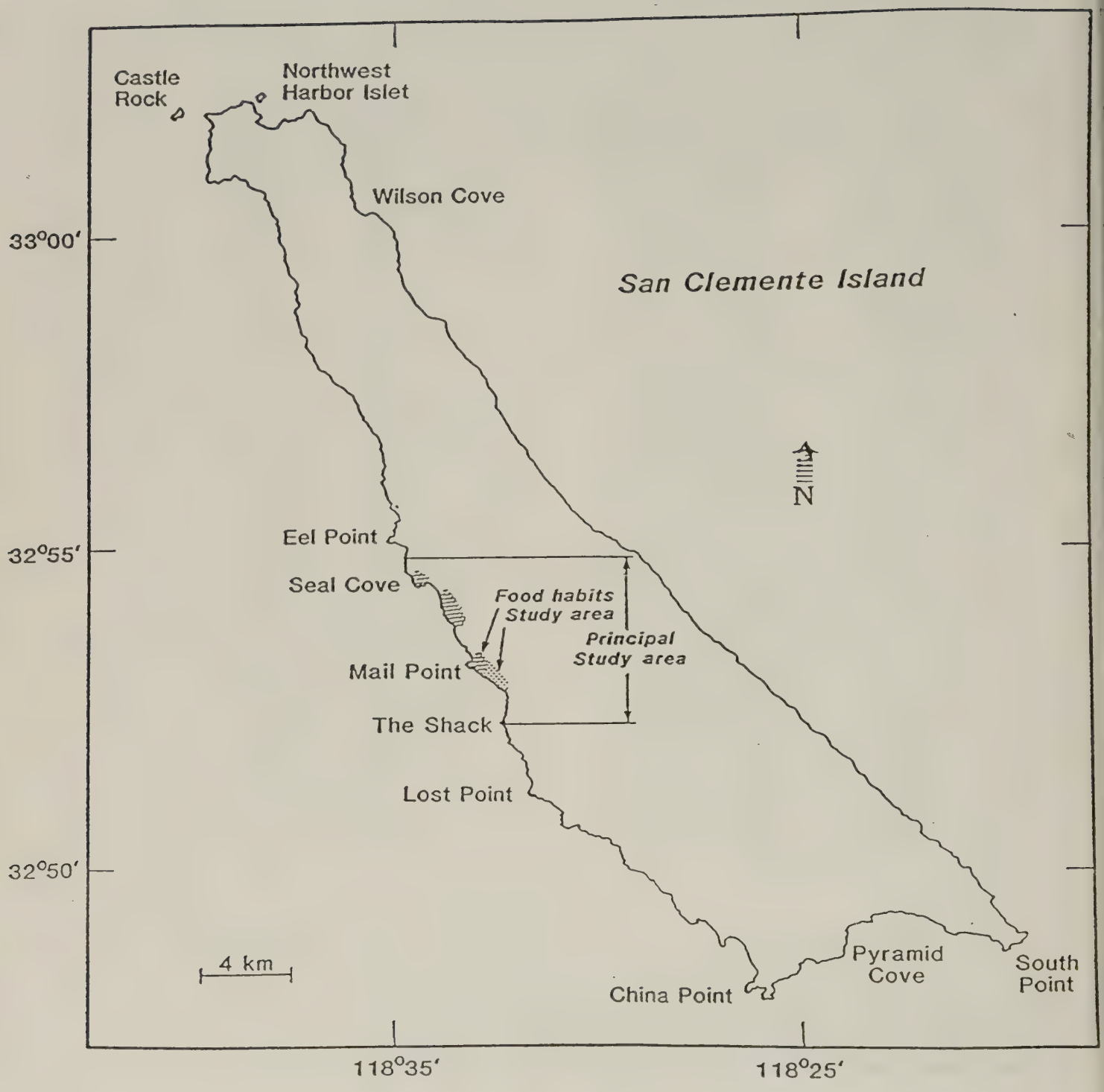
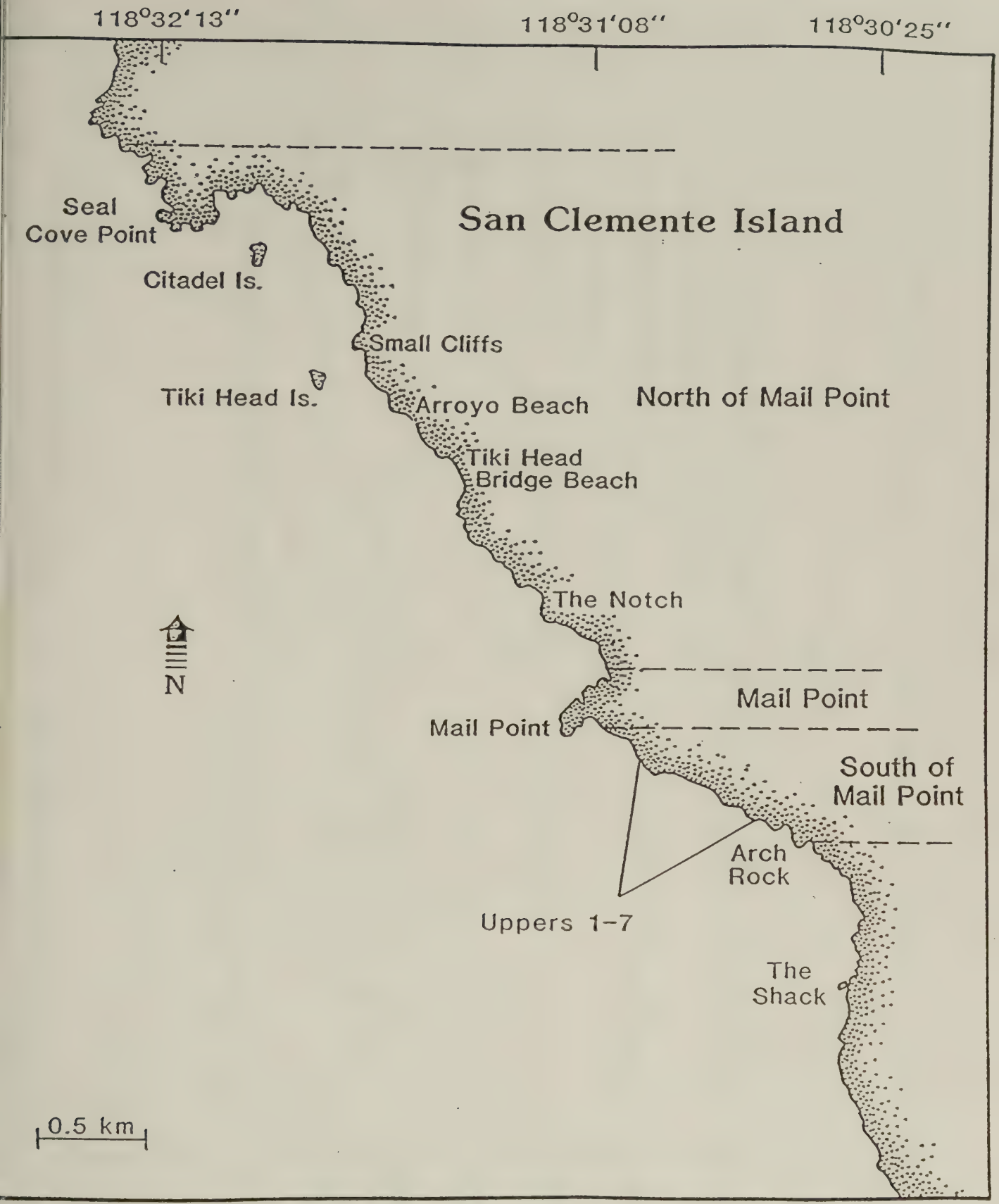


Figure 1. Map of San Clemente Island showing principal study area and food habit study area during 1981-1991. Observed breeding areas are indicated by crosshatch. Areas used primarily as haulouts are indicated with stipple.



igure 2. San Clemente Island principal study area showing the hree sub-areas; north of Mail Point (NMP), Mail Point (MP), and outh of Mail Point (SMP)

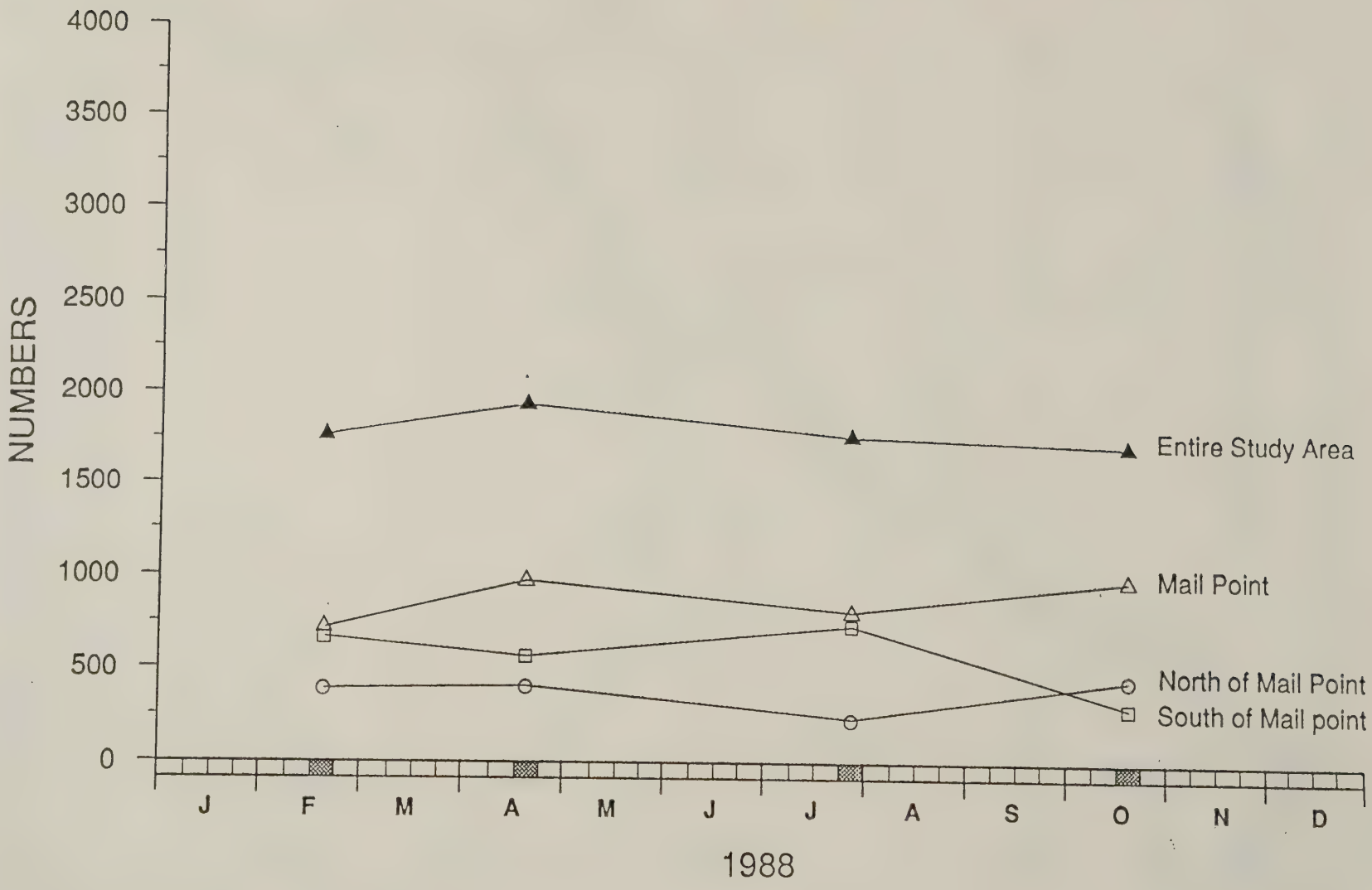


Figure 3. Numbers of California sea lions, by subarea, counted at San Clemente Island during 1988.

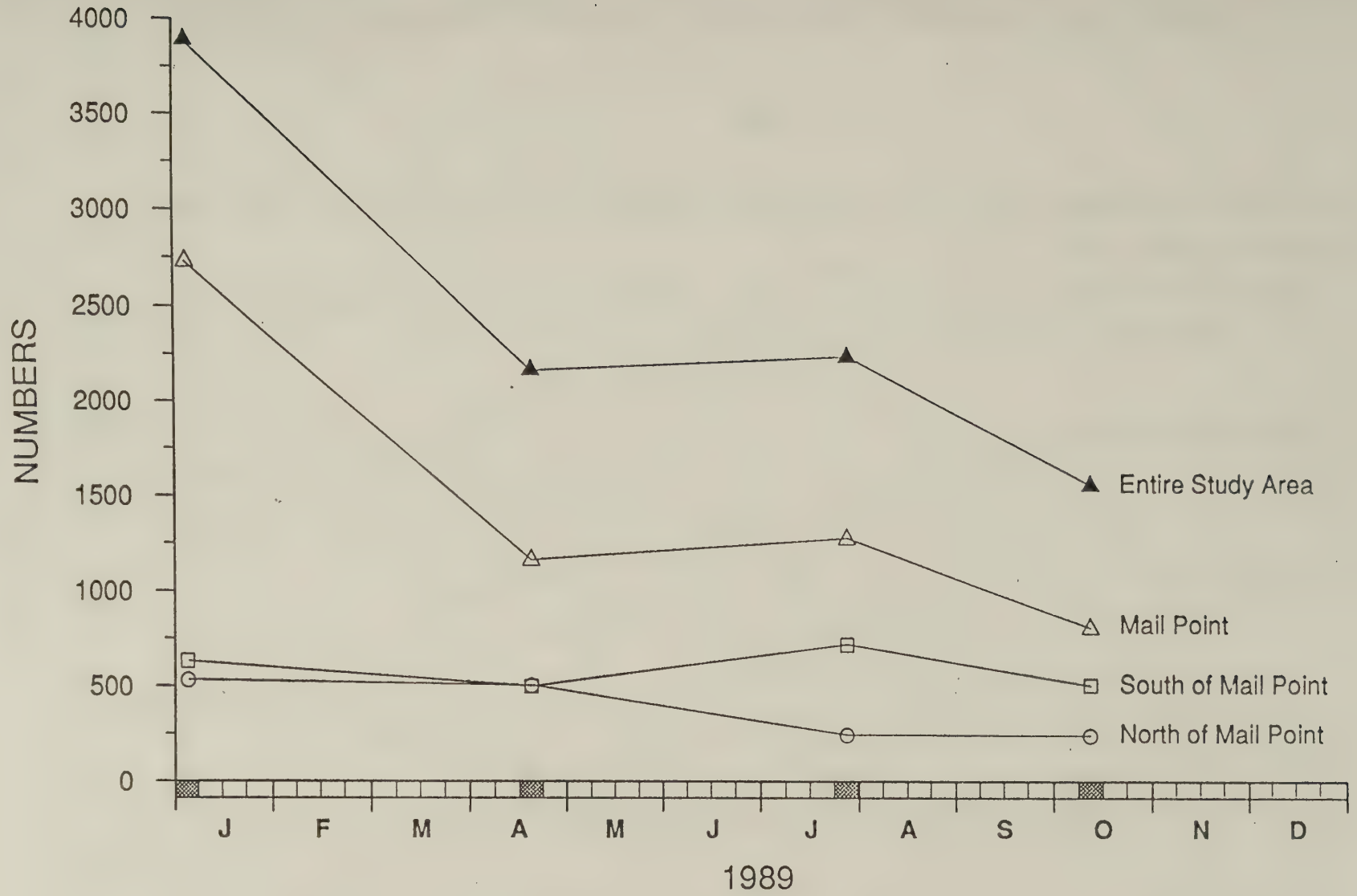


Figure 4. Numbers of California sea lions, by subarea, counted at San Clemente Island during 1989.

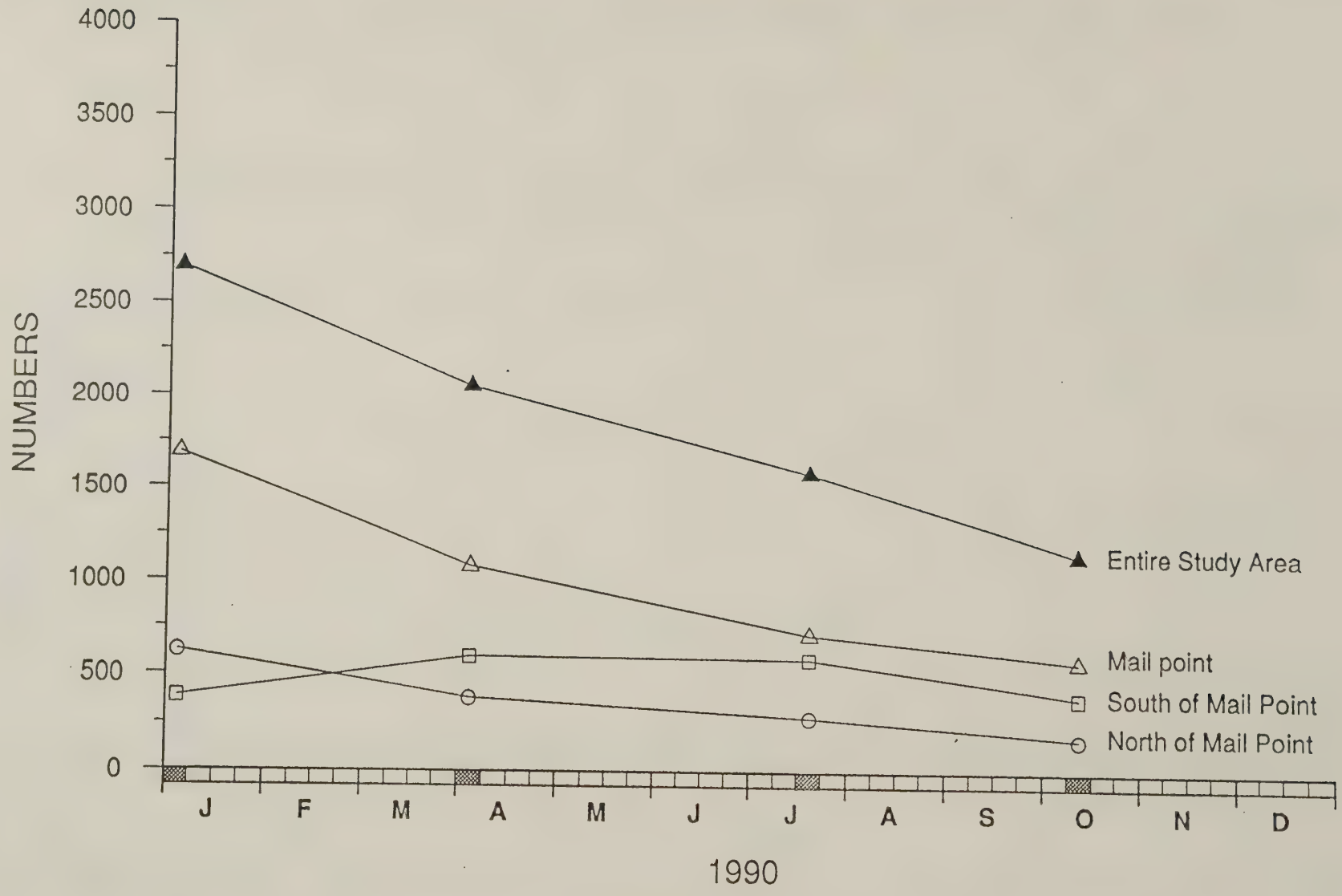


Figure 5. Numbers of California sea lions, by subarea, counted at San Clemente Island during 1990.

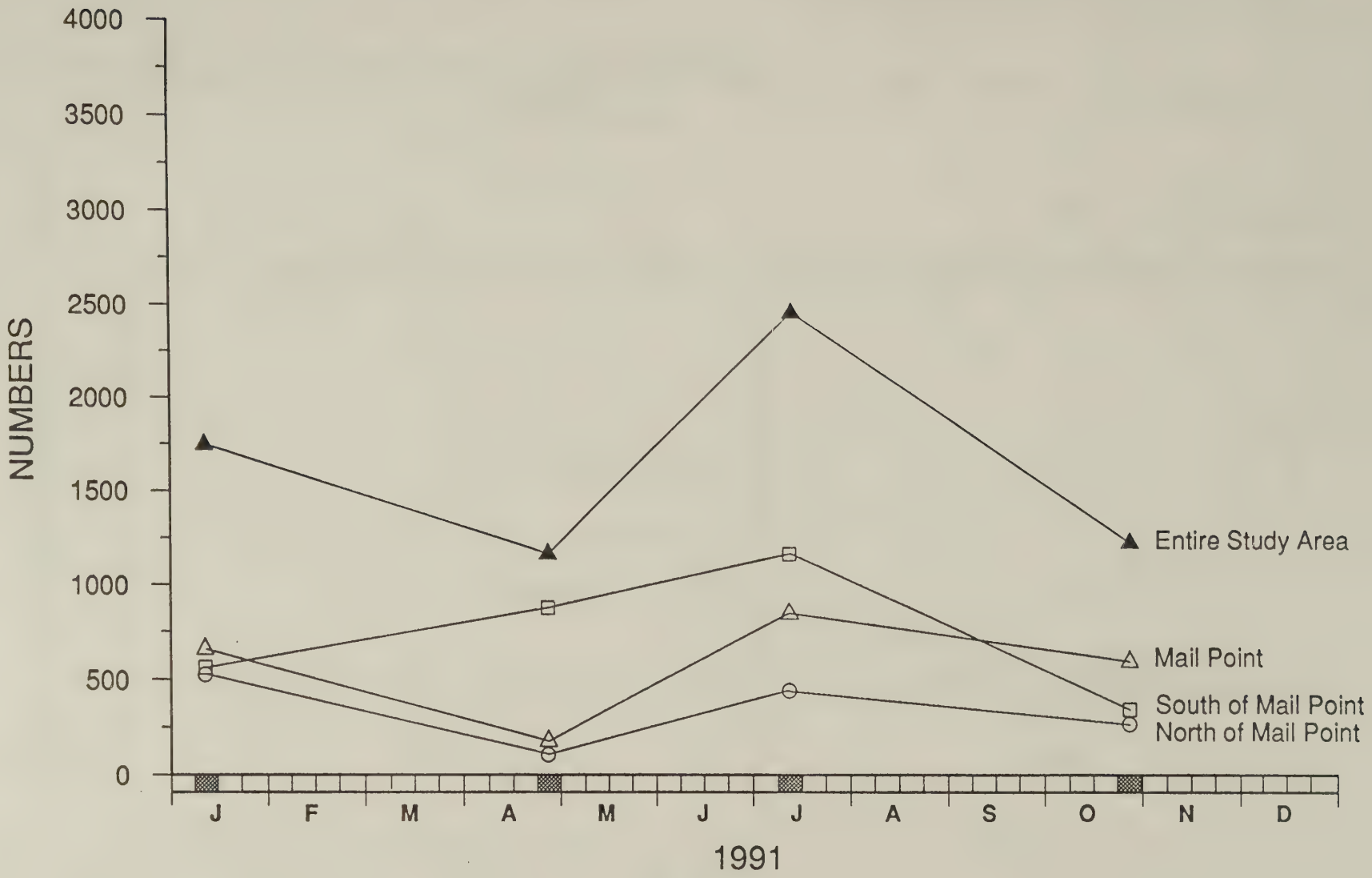


Figure 6. Numbers of California sea lions, by subarea, counted at San Clemente Island during 1991.

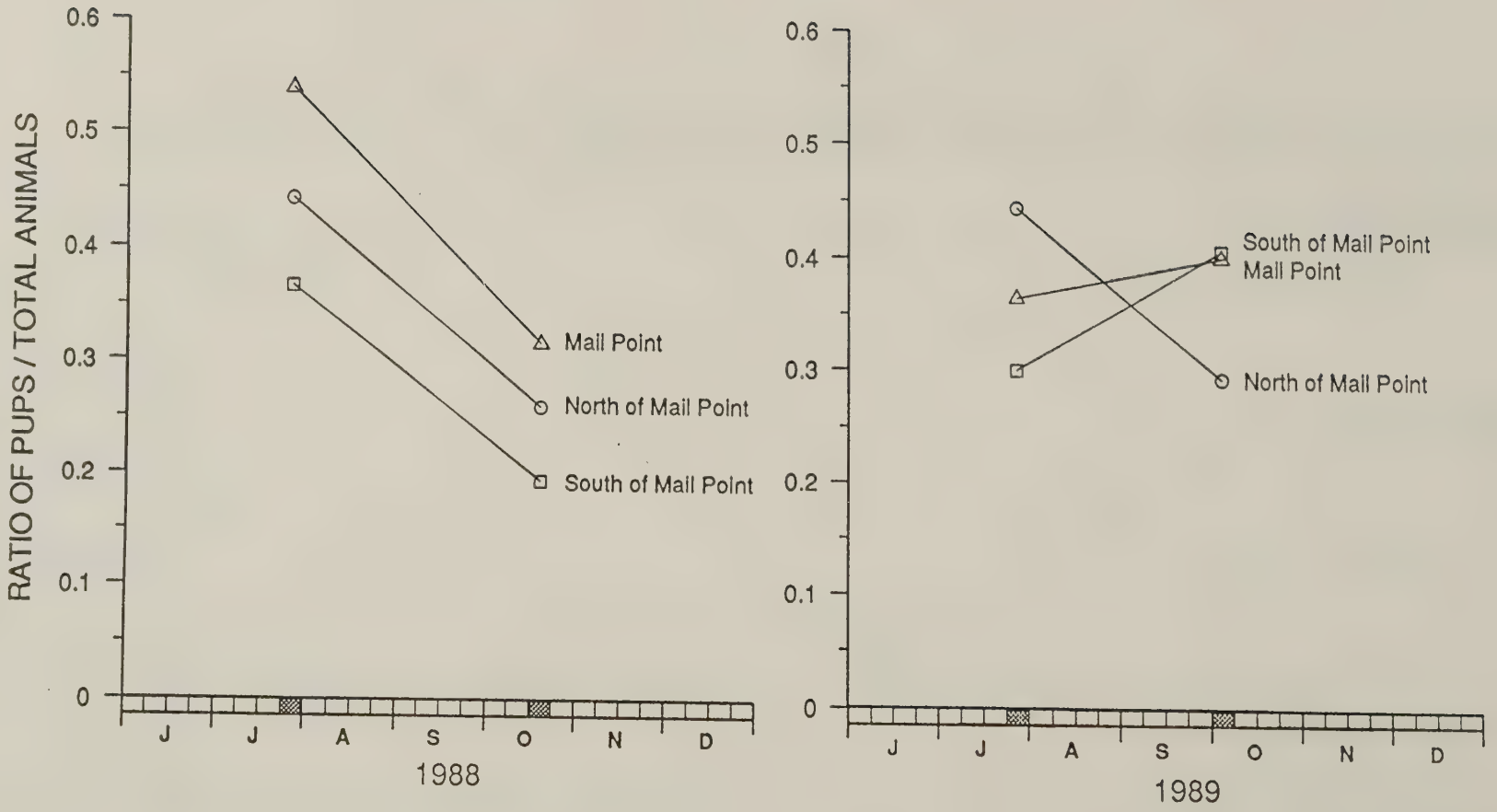


Figure 7. Ratios of California sea lion pup counts to total counts at San Clemente Island, by subarea, during 1988 and 1989.

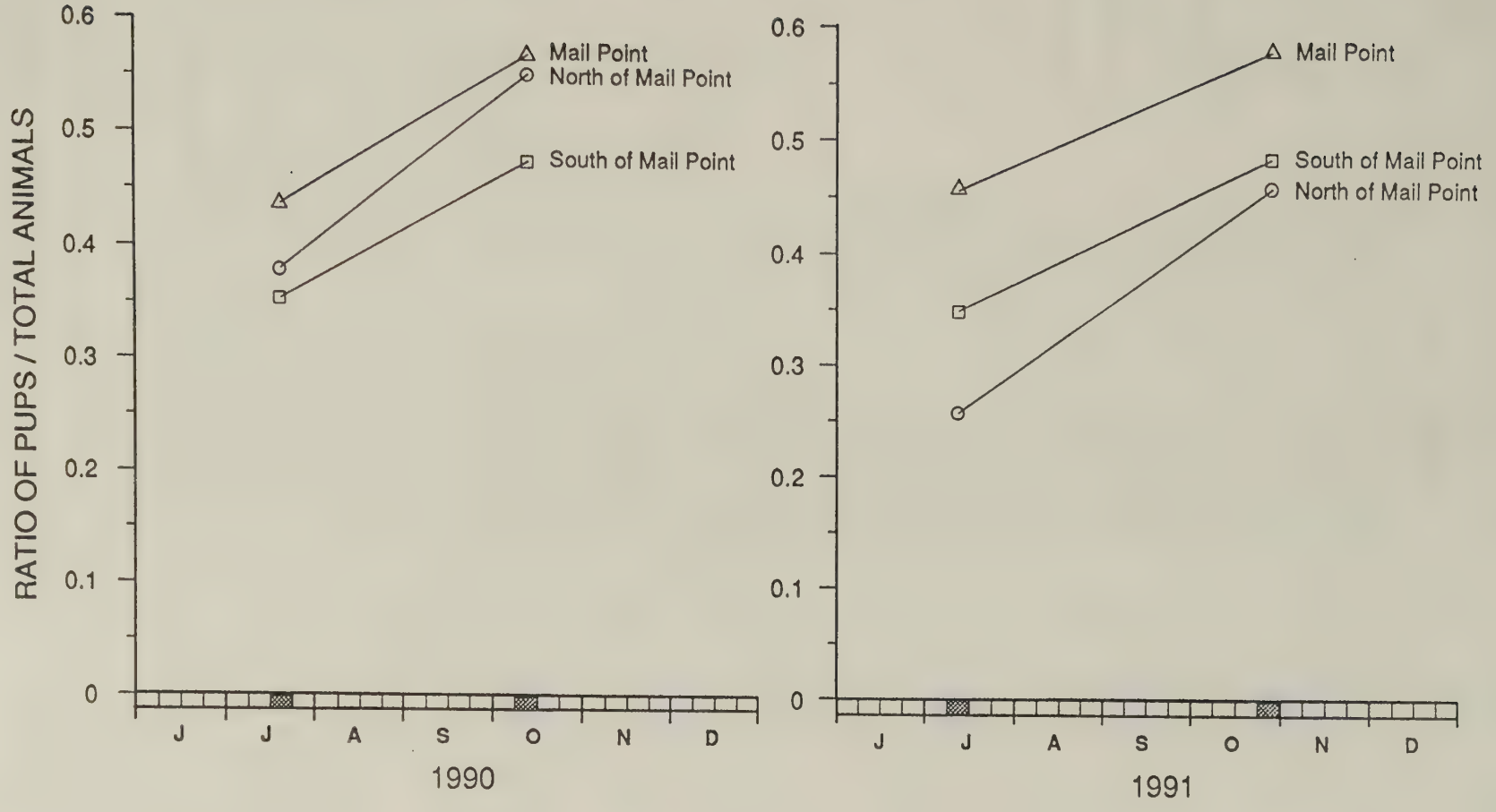


Figure 8. Ratios of California sea lion pup counts to total counts at San Clemente Island, by subarea, during 1990 and 1991.

Appendix 1. Strandings of dead marine mammals on San Clemente Island, 1988-1991.

DATE	SPECIMEN NUMBER	SPECIES[1]	LATITUDE	LONGITUDE	SEX[2]	AGE CLASS[3]	COMMENTS
880219		PW	33 00'42''N	118 36'24''W	U		227cm;no flukes
880219		P	33 00'42''N	118 36'24''W	F		160cm
880416		Z	32 53'07''N	118 31'08''W	U	PRE	
880416		Z	32 53'07''N	118 31'08''W	U	PRE	
880416	CW00959	Z	32 53'07''N	118 31'08''W	U	PRE	fresh today
880416	MSL0296	NRWD	32 52'57''N	118 30'48''W	U		207cm;skull taken
880417		Z	32 53'07''N	118 31'04''W	U	PRE	
880417	CW00960	M	32 53'15''N	118 31'12''W	F	Y	240cm
880417	CW00961	M	32 53'15''N	118 31'12''W	M	Y	167cm;shark bite
880417	CW00962	Z	32 53'15''N	118 31'12''W	M	J	114cm
880417	CW00963	Z	32 53'15''N	118 31'12''W	U		
880417	CW00964	P	32 53'15''N	118 31'12''W	F		87cm
880729		Z	32 54'05''N	118 31'42''W	U	J	
880730	CW00965	Z	32 52'57''N	118 30'48''W	M	A	231cm;skull taken
890106		Z	32 53'50''N	118 31'33''W	U		
890106		Z	32 53'10''N	118 31'07''W	U		
890106		Z	32 53'10''N	118 31'07''W	U		
890114		Z	32 52'43''N	118 30'40''W	U	P88	
890114		Z	32 52'43''N	118 30'40''W	U	P88	
890114		Z	32 52'43''N	118 30'40''W	U	P88	
890114		Z	32 52'43''N	118 30'40''W	U	A	
890114		Z	32 52'43''N	118 30'40''W	U	A	
890114		Z	32 53'07''N	118 31'04''W	U	A	
890114		Z	32 53'22''N	118 31'12''W	U		
890114		Z	32 53'22''N	118 31'12''W	U		
890114		Z	32 53'22''N	118 31'12''W	U		
890114		Z	32 53'22''N	118 31'12''W	U		
890114		Z	32 53'22''N	118 31'12''W	U		
890114		Z	32 53'22''N	118 31'12''W	U		
890114		Z	32 53'22''N	118 31'12''W	U		
890114		Z	32 53'22''N	118 31'12''W	U		
890114		Z	32 53'22''N	118 31'12''W	U		
890114		Z	32 53'22''N	118 31'12''W	U		
890114		M	32 53'22''N	118 31'12''W	U		
891014		Z	32 52'43''N	118 30'40''W	U	P88	
891014		Z	32 52'43''N	118 30'40''W	U	P88	
891014		Z	32 52'43''N	118 30'40''W	U	P88	
891014		Z	32 52'43''N	118 30'40''W	U	A	
891014		Z	32 53'07''N	118 31'04''W	U	A	

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P=Harbor seal (Phoca vitulina richardsi)
Z=California sea lion (Zalophus californianus)

[2] SEX: M=Male; F=Female; U=Unknown

[3] AGE CLASS: P88=Pup of 1988; P89=Pup of 1989; P90=Pup of 1990; P91=Pup of 1991
Y=Yearling; J=Juvenile;
SA=Subadult; A=Adult; U=Unknown; PRE=Premature of the year

ppendix 1. continued.

ATE	SPECIMEN NUMBER	SPECIES[1]	LATITUDE	LONGITUDE	SEX[2]	AGE CLASS[3]	COMMENTS
00105		Z	32 54'05''N	118 31'42''W	U		
00105		Z	32 54'05''N	118 31'42''W	U		
00105		Z	32 52'59''N	118 30'55''W	U		
00407		Z	32 52'57''N	118 30'48''W	F	A	
00407		Z	32 52'57''N	118 30'48''W	F	A	
00407		Z	32 52'57''N	118 30'48''W	U	J	
00407		Z	32 52'57''N	118 30'48''W	U	J	
00407		Z	32 53'07''N	118 31'08''W	U	PRE	
00407		Z	32 53'07''N	118 31'08''W	U	PRE	
00721	CW00966	Z	32 53'00''N	118 30'57''W	M	A	216cm;skull taken
00721		Z	32 53'00''N	118 30'57''W	M	A	
00721		Z	32 53'07''N	118 31'08''W	U	P90	
00721		Z	32 53'07''N	118 31'08''W	U	P90	
00721		Z	32 53'07''N	118 31'08''W	U	P90	
00721		Z	32 53'07''N	118 31'08''W	U	P90	
00721		Z	32 53'07''N	118 31'08''W	U	P90	
00721		Z	32 53'07''N	118 31'08''W	U	P90	
00721		Z	32 53'07''N	118 31'08''W	U	P90	
00721		Z	32 53'07''N	118 31'08''W	U	P90	
00721		Z	32 53'07''N	118 31'08''W	U	P90	
00721		Z	32 53'07''N	118 31'08''W	U	P90	
00721		Z	32 53'07''N	118 31'08''W	U	P90	
00721		Z	32 53'07''N	118 31'08''W	U	P90	
00721		Z	32 53'07''N	118 31'08''W	U	P90	
00721		Z	32 53'07''N	118 31'08''W	U	P90	
00721		Z	32 53'07''N	118 31'08''W	U	P90	
00721		Z	32 53'07''N	118 31'08''W	M	A	
00721		Z	32 53'07''N	118 31'08''W	F	A	

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Appendix 1. continued.

DATE	SPECIMEN NUMBER	SPECIES[1]	LATITUDE	LONGITUDE	SEX[2]	AGE CLASS[3]	COMMENTS
901013		Z	32 53'07''N	118 31'08''W	U	P90	
901013		Z	32 53'07''N	118 31'08''W	U	P90	
901013		Z	32 53'07''N	118 31'08''W	U	P90	
901013		Z	32 53'07''N	118 31'08''W	U	P90	
901013		Z	32 53'07''N	118 31'08''W	U	P90	
901013		Z	32 53'07''N	118 31'08''W	U	P90	
901013		Z	32 53'07''N	118 31'08''W	U	P90	
901013		Z	32 53'07''N	118 31'08''W	U	P90	
901013		Z	32 53'07''N	118 31'08''W	U	P90	
901013		Z	32 53'07''N	118 31'08''W	U	P90	
901013		Z	32 53'07''N	118 31'08''W	U	P90	
901013		Z	32 53'07''N	118 31'08''W	U	P90	
901013		Z	32 53'07''N	118 31'08''W	U	P90	
901013		Z	32 53'07''N	118 31'08''W	U	P90	
901013		Z	32 53'07''N	118 31'08''W	U	P90	
901013		Z	32 53'00''N	118 30'57''W	M	J	canines taken
901013		Z	32 53'00''N	118 30'57''W	F	A	canines taken
901013		Z	32 53'00''N	118 30'57''W	F	A	canines taken
901013		Z	32 53'00''N	118 30'57''W	F	A	canines taken
901013	CW00970	Z	32 53'00''N	118 30'57''W	M	A	skull taken
901015		Z	32 53'22''N	118 31'12''W	U	P90	
901015		Z	32 53'22''N	118 31'12''W	U	P90	
901015		Z	32 53'22''N	118 31'12''W	F	A	canines taken
910112	CW00971	Z	32 52'51''N	118 30'36''W	M	SA	230cm;skull taken
910426		Z	32 52'57''N	118 30'48''W	F	PRE	60cm;umbilical
910426		Z	32 52'57''N	118 30'48''W	U	PRE	fresh
910426		Z	32 52'57''N	118 30'48''W	U	PRE	fresh
910426		Z	32 52'57''N	118 30'48''W	U	PRE	fresh
910426		Z	32 52'57''N	118 30'48''W	U	PRE	fresh
910427		Z	32 53'07''N	118 31'08''W	F	PRE	
910427		Z	32 53'07''N	118 31'08''W	U	PRE	
910427		Z	32 53'07''N	118 31'04''W	U	PRE	
910427		Z	32 53'07''N	118 31'04''W	U	PRE	
910427		Z	32 53'07''N	118 31'04''W	U	PRE	
910427		Z	32 52'43''N	118 30'40''W	F	PRE	
910427		Z	32 52'43''N	118 30'40''W	U	PRE	
910427		Z	32 52'43''N	118 30'40''W	U	PRE	
910427		Z	32 52'43''N	118 30'40''W	U	PRE	
910427		Z	32 52'43''N	118 30'40''W	U	PRE	
910428		Z	32 53'07''N	118 31'04''W	U	PRE	

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ppendix 1. continued.

ATE	SPECIMEN NUMBER	SPECIES[1]	LATITUDE	LONGITUDE	SEX[2]	AGE CLASS[3]	COMMENTS
11025		Z	32 53'07''N	118 31'08''W	U	P91	
11025		Z	32 53'07''N	118 31'08''W	U	P91	
11025		Z	32 53'07''N	118 31'08''W	U	P91	
11025		Z	32 53'07''N	118 31'08''W	U	P91	
11025		Z	32 53'07''N	118 31'08''W	U	P91	
11025		Z	32 53'07''N	118 31'08''W	U	P91	
11025		Z	32 53'07''N	118 31'08''W	U	P91	
11025		Z	32 53'07''N	118 31'08''W	U	P91	
11025		Z	32 53'07''N	118 31'08''W	U	P91	
11025		Z	32 53'07''N	118 31'08''W	U	P91	
11025		Z	32 53'07''N	118 31'08''W	U	P91	
11025		Z	32 53'07''N	118 31'08''W	U	P91	
11025		Z	32 53'07''N	118 31'08''W	U	P91	
11025		Z	32 53'07''N	118 31'08''W	U	P91	
11025		Z	32 53'07''N	118 31'08''W	U	P91	
11025		Z	32 53'07''N	118 31'08''W	U	A	
11025		Z	32 53'07''N	118 31'08''W	U	J	
11025		Z	32 53'07''N	118 31'08''W	U	J	
11025		Z	32 53'11''N	118 31'06''W	F	A	canines taken by MSL
11025		Z	32 53'11''N	118 31'06''W	U	A	
11025		Z	32 53'11''N	118 31'06''W	U	J	

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